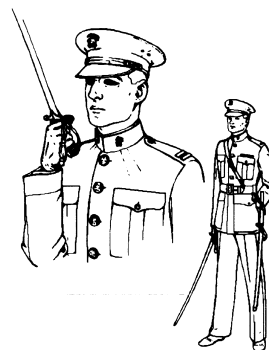
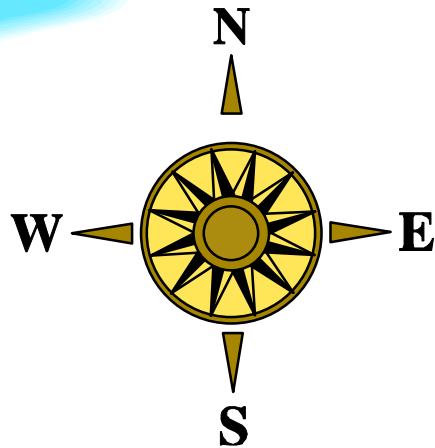
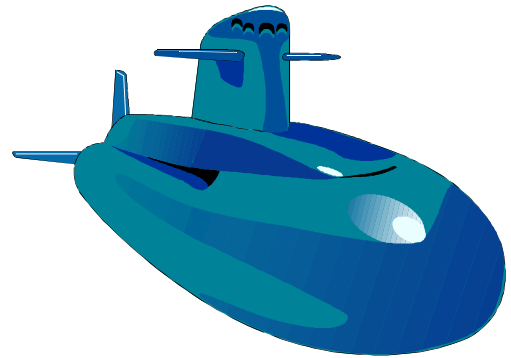
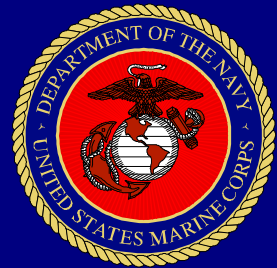


Weapons Support Team



NEWSLETTER

"Aiming For Quality"



January 1997

From the Senior NAVAIR Red Shirt

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This newsletter is intended as an informal means of communication between the Naval Aviation Systems Weapons Support Team and fleet weapons/ordnance handling personnel. The publication is approved for official dissemination of professional information of interest to the ordnance community. Reference to regulations, orders and directives is for information only and does not by publication herein constitute authority of action. Articles of interest on programs, personnel, or other issues, may be submitted to:

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WEAPONS FUNDING ISSUES

By D. Fellows
APEO(CU) Logistics

Over the years there has been a steady reduction in operations and support funding. Commonly referred to as O&S or Operational and Maintenance, Navy O&M,N, these dollars are used to support weapons maintenance, weapons and fleet support, and other weapons related efforts. During these years, new weapons production has helped to offset major readiness degradation related to funding shortfalls.

Today, 25 weapons systems are out of production and are totally dependent upon O&M,N for funding. The competition for funding within the Navy is at high levels. As the competition takes away the budget, we must find more innovative methods to continue products and services. For example, missile maintenance due date extensions are becoming normal. This is considered undesirable, but necessary due to a lack of funds. Other initiatives include cross-decking weapons and longer Service-In-Service Times (SIST) for weapons systems. This buys us short term relief, but may be actually mortgaging the future.

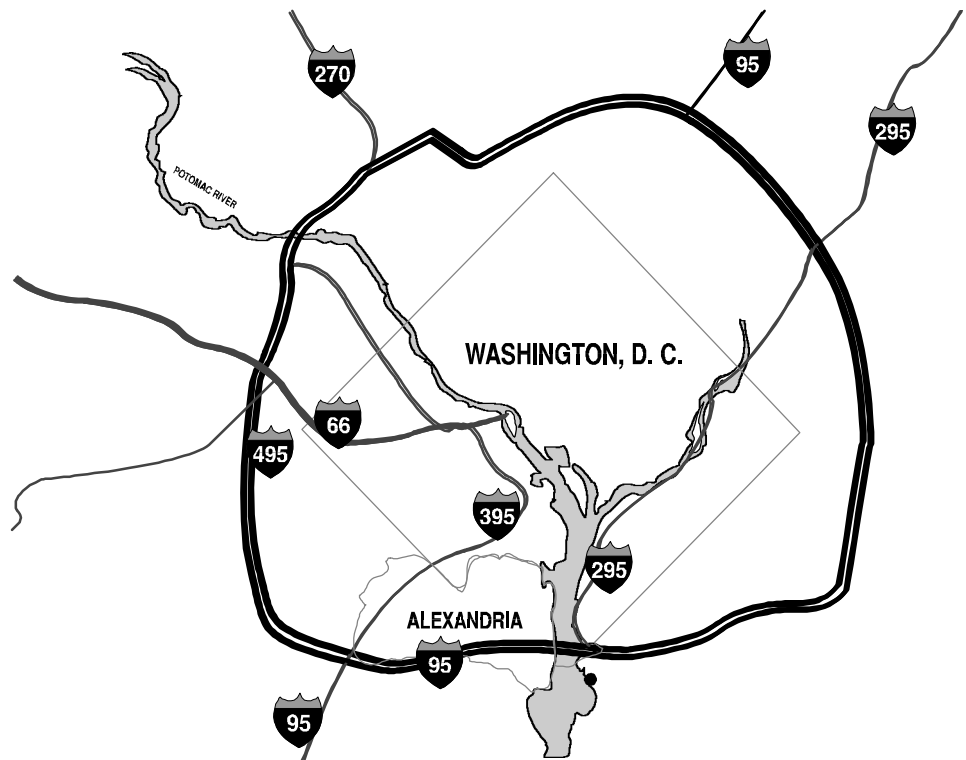
As we look beyond FY97 into the last two years of this century and beyond, what do we see? Additional budget cuts, downsizing of personnel, and an increased demand for scarce funding. Asset readiness is dropping. To offset this, readiness requirements are being lowered as the appearance of less funding is needed. Then additional rounds of budget cuts are taking place.

In FY97, we endured a budget cut on 1 Oct 96 and a promise to expect more. The Navy has a serious Defense Budget Operating Funds bill to pay and we anticipate an adjustment to our operating budget to help pay that bill. What does all this mean to fleet weapons support? Quite simply, if we do not change our attitudes and business operations, we will have serious problems meeting our obligations.

Here to fore, we have managed to offset these deficits with some quick and efficient planning. However, with the scope and depth of current and future anticipated cuts, we need to work closer with fleet management to minimize the impacts and enhance efficiency. If the rate of funding reductions continues at the present pace, we can

(Continued on page 8)

View from the Beltway



The Ax Swings. Congress is ordering further headquarters cuts in the Air Force, Army, Navy, and Marine Corps. The ax will be directed at both civilian and military headquarters personnel. The acquisition corps, likewise, is facing more pain. In the Fiscal Year 1995 authorization bill, a 20 percent cut of the acquisition work force was ordered. Included was a one time purge of 15,000 employees. The new marching orders call for another 15,000 reduction in acquisition slots by the end of Fiscal Year 1997.

Layer by Layer. The recent recommendation by the House national security research and development panel not to fund the standard take-off and vertical lift version of the joint strike fighter lends to speculation that the program may not continue, in its entirety. "If you can peel one part of the program off, then you can peel others off as well," said Steven L. Madey, professional staff member, Senate Armed Services Committee. *'Only cost effective programs will survive.'*

Cutting to the Chase. More than 100 top defense corporation executives met with a glittering array of Navy Department civilian chiefs, admirals, and Marine Corps generals at a no-holds-barred meeting in Norfolk. This by-invitation-only affair represents the second iteration of an ADPA sponsored conference that is aimed at further improving the weapons system acquisition process.

Pork Is Good. Congressional add-ons in the Fiscal Year 1997 defense authorization bill are called pork by most observers, but the Pentagon is not complaining. Said chief Pentagon spokesman Kenneth H. Bacon to reporters, "The [add-on's] don't saddle us with vast new costs for which we hadn't planned. You could say that it may save us from spending money in the out years. If money had to be added to the bill, that's the best way to do it."

Taking Stock. Maintaining a viable industrial base is a priority for John M. Douglass, Navy Assistant

(Continued on page 5)

Naval Airborne Weapons Maintenance Program



The Maintenance Program for the Airborne Weapons Community

“Who can change the NAWMP?”

At any given time, anyone and everyone involved with naval airborne weapons and associated support equipment may submit a change recommendation to the OPNAVINST 8600.2B. Detailed instructions for submitting changes and corrections are contained in OPNAVINST 8600.2B Volume I, Section I.

INTERIM CHANGE 001-96 TO OPNAVINST 8600.2B CHANGE ONE

This Interim Change 001-96 promulgates information for Air Launched Missile (ALM) Serviceable-In-Service-Time (SIST) for the HARPOON/SLAM and PENGUIN missiles. Interim change 001-96 released as NAVAIRWARCENWPNDIV PT MUGU message DTG 100029Z OCT 96.

“When’s the next change to OPNAVINST 8600.2B?”

Change 1 to OPNAVINST 8600.2B was signed 16 JUNE 1996, date of Change 16 JULY 1996 with an effective date 1 AUG 1996.. Change 1 consist of the following:

- update cognizant field activity for Pioneer UAV

- update information to equipment history cards
- update BLU-110/B, BLU-111/B and Naval Ordnance Center Inventory Management system
- update Sparrow
- update appendix-A Missile configuration summary/log sheet and captive carry information
- update Serviceable In Service Times for Hellfire, Sidewinder and Tow
- update information for Tactical Air Launched Decoy (TALD) and Improved Tactical Air Launched Decoy (ITALD)
- addition of Laser Guided Training Round (LGTR) to the instruction
- deletion of airborne weapon system recurring problem
- deletion of Skipper, Laser Guided Training Round, Laser Guided Bombs (all variants) except GBU-24B/ B), MK-20 Rockeye with MK 339 fuze, Walleye (all variants) from Firing Reporting Requirements Appendix-G
- Incorporation of Integrated Weapons System Review (IWSR) Support
- Promulgated preservation policies for support equipment, aviation weapons support equipment, and weight handling equipment, and numerous corrections to the instruction.
- Semi-annual gun reporting

(Continued on page 5)

Escape Smoke Inhalation With Emergency Hood

A hood to prevent smoke inhalation is being manufactured by Brockdala International Systems Inc., Vancouver, Canada. Up to 20 minutes of filtered air is provided by the EVAC-U8 Emergency Escape Smoke Hood.

The hood, which withstands temperatures up to 800 degrees Fahrenheit, protects eyes, head, and neck from flames with its Teflon-coated Kapton material. The translucent hood also allows for continued visibility and hearing.

The hood is stored in a canister containing a multi-stage filter which removes carbon monoxide and other gases present during a fire. The canister is made of heat-resistant polycarbonate plastic.

Weighing less than 11 ounces, the canister is about the size of a soft drink can. The unit comes with a wall mount, and also features a luminescent canister bottom in order to help find it in the dark or unfamiliar places. □

(Continued from page 4)

NAWMP

Questions/comments/distribution:
NAWCWPNS Pt Mugu CA
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Mr Larry Cowell
DSN 351-6323/6500 or
Comm (805) 484-6323/6500
FAX: (805) 484-6742 □

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VIEW

Secretary for Research, Development, and Acquisition. 'Last year, the Navy Department bought the lowest number of ships since 1933,' says Douglass. 'Low production rates combined with the fact that our country has let its commercial shipbuilding industry fall to a scandalously low level means we have an industrial base issue in the Navy.'

From Tears to Cheers.

Marine Corps Commandant Gen. Charles C. Krulak, USMC, tells *Washington Pulse* that after three years he has seen the Navy's focus on littoral waters mine warfare substantially sharpen and improve. He said that while the investments being made in combating underwater mines are beginning to pay-off, there are still areas where the military is falling short. A senior Navy official said the service has laid out a logical, incremental plan to bolster its countermine forces that addresses the sectors that still concern the Marine Corps Commandant.

Don't Ask Sherwin Williams.

Nixing the paint has been bandied about as a possible way to reduce Joint Strike Fighter production costs. "We'd like to make a paintless airplane," said Rear Adm. Craig Steidle, USN, Joint Strike Fighter program manager. "There's an extreme cost associated with paint applied to airplanes and taking paint off airplanes. □

Senior Navy Official Points to SC-21, CV(X) As Key Research and Development Programs

The next generation surface combatant SC-21 and a new aircraft carrier CV(X) are two major research and development programs that will be the basis for the 21st century Navy, said John M. Douglass, assistant Navy Secretary for Research, Development, and Acquisition. "They are our critical future programs," he said.

The two programs will not be developed independently, he said. Douglass told National Defense the service is considering the "building blocks that go into a surface combatant ship the light of both programs". The Navy is looking at areas such as propulsion systems and fire control across both programs.

Another program the Navy is heavily betting on, the smart ship, will eventually reduce overhead cost he said. It is specifically aimed at reducing maintenance and crew size. Douglass strongly supports this program that is focused on modifying existing ships. There are two ships-one based on each coast-that are testing and evaluating technology and procedures aimed at cutting operating costs. □

HARPOON / SLAM / SLAM ER SUPPORT TEAM

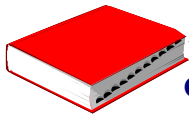


Reporting missile deficiencies (EMR/CODR) in the **FLEET** is of the utmost importance. Reporting these deficiencies to your support team will enable us to provide you (the fleet) with current up to date information and analysis.



With downsizing and increased workload, providing the best quality weapons to the fleet has become more difficult but remains the number one requirement of the professionals that support these weapons. Without the deficiencies being reported, your support **TEAM** cannot identify trends and justify modifications or changes to eliminate the problems.

The proper format for reporting deficiencies is IAW **OPNAVINST 8600.2B** for **AIRBORNE** weapons, which **HARPOON** and **SLAM** are, and are under the cognizance of NAVAIRSYSCOM.



However, the format of the reports when using OPNAVINST 5102. 1C or 5100.21B or the **OPNAVINST 8600.2B** is basically the same.

The **TEAM** is changing with downsizing and restructuring but overall is improving to provide the best support to the fleet as possible, During these changes, points of contact along with locations may also be changing, but should not affect time or results in conducting investigations. analysis and responding to the reported deficiencies.



Keep the **TEAM** strong and dedicated to the end results of **Quality**. The fleet is built as a **TEAM** from its inception, big or small, all the players count. Everybody must be a **TEAM** member and strive for the end goal of winning by identifying, reporting, investigating, trend analysis and correcting the deficiencies.



Don't forget that scheduled maintenance! Maintaining the assets through planned maintenance scheduling is a vital key to readiness and your assurance that the weapons are going to do what they were designed to do. Report any problems you encounter and address the appropriate CFA's for improving the maintenance procedures.



NAWCWPNS field reps and **RSSI** personnel are available during onloads and offloads at the weapons stations to perform Missile Sentencing Inspections (MSI's), to assist with any questions and maintain close liaison with CFAs.



The problem you encounter and report may also be, or will be, encountered by others in the Fleet. Your **"HEADS UP"** can help prevent or reduce the number of similar problems fleet wide.



The **CAN DO** attitude is more important today than ever!



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(Continued from page 2)

FUNDING

anticipate additional weapons readiness degradation, draw down of serviceable inventory, increased maintenance burden, reduced weapons reliability, reduction or elimination of on site/on call fleet support (ETS), and other services. Right sizing and outsourcing can only delay the inevitable. Granted, this is a gloomy future to look forward to, but there is a silver lining, yet untapped. In order to survive, we must enter into an active partnership to preserve and properly utilize our ever increasing scarce resources. Many budget drills are short notice with short turn around times and can be adequately addressed. However, as we move forward, we at NAVAIR recognize that we must cement our partnerships with the TYCOMs and Force Weapons Officers if we are to adequately address the true nature and impacts of funds reductions.

This year has just started, and already it is being called the worst budget year since the prohibition era. What can we look forward to? More of the same. We need to work with our customers and need you, our customers, to work with us so that we may continue vital services and reduce lower priority requirements. □



*Theater TBMD
Lead Vehicle*

Navy Steps Up Pace of TBMD

The Navy plans to begin engineering and manufacturing development (EMD) in early 1997 on the block 4A version of the Standard SM2 air-defense missile planned for use in the Navy's "area" or lower-tier theater ballistic missile defense (TBMD) system. The EMD phase will coincide with the start of concept exploration (CE) and flight demonstrations of the theater-wide, or upper-tier, variant of the SM-2, referred to as SM-X.

Standard Missile Company, a joint venture of Hughes Missile Systems and Raytheon Electronics, is the prime contractor for development of both variants of the SM-2 missile, including the guidance subsystem and rocket motor.

Cdr. Tom Andress, Navy TBMD program coordinator at the Ballistic Missile Defense Organization (BMDO), says that, in Navy TBMD operations, the lower- and upper-tier SM-2 variants, launched from Ticonderoga-class Aegis guided missile cruisers and Arleigh Burke-class guided missile destroyers, will destroy TBMs in the descent phase; the exoatmospheric SM-X theater defense missile also will be capable of destroying them in their ascent and midcourse phases.

Both variants are based on guidance, propulsion, and warhead upgrades to the SM-2 block 4 Aegis extended-range air-defense missile. The block 4A lower-tier missile will be fitted with an infrared (IR) seeker for detection

of the intense heat signatures generated by TBMs as they pass through the atmosphere in their descent phase.

The SM-X upper-tier theater defense weapon will be fitted with a light exoatmospheric projectile (LEAP), a kinetic kill vehicle (KKV) designed to destroy TBMs by kinetic impact.

Target 2000

Hughes is acting as prime contractor for the LEAP, and is supported by Boeing/Rockwell International, which also developed a LEAP concept. The LEAP, which weighs about 15 pounds, *will use* a long-wave infrared focal-plane array seeker for exoatmospheric target acquisition at ranges in excess of 180 miles and a fiber-optic inertial measurement unit for midcourse and terminal guidance.

Dean Gehr, manager of the LEAP program at Hughes, says that development and testing of the SM-2 block 4A and SM-X also parallels continuing work on the LEAP, which between 1992 and 1995 underwent a four-launch test program in which LEAP vehicles built by Hughes and Rockwell were fitted to older Terrier variants of the SM-2.

The Navy hopes to have the SM-X ready for full-scale EMD by 2000. Funding for the theater-wide program was increased in the FY 1997 defense authorization bill from \$60 million to \$306 million; the area-defense development program was funded at \$311 million. The initial Navy TBMD production systems, Andress says, could be fielded by 2002. □

AMRAAM

AIM-120B/C



The following two articles have been extracted from the AMRAAM-O-GRAM's dated February and June of 1996.

AIM-120B CATM MYTHS



*Major T.A. Drechsler, AMRAAM
Program Office, Pt Mugu CA,
DSN 351-1407*

OFP 11C for the F/A-18 will be released to the Fleet during the Dec 96 time frame for the APG-65 users and two to three months later for RUG. OFP-11C is the first and only OFP that will permit carriage of the already fielded CATM AIM-120. CATM-B will be carried on any AMRAAM capable station using the new 1760 WIP code F3. CATM-B cannot be carried with OFPs 91C, 09C or 09CR. In addition, a NAVAIR flight clearance **HAS NOT** been issued and is still pending, but is anticipated prior to the release of 11C.

At the time of this original article the AMRAAM program had not received CATM-C deliveries. Delivery of CATM-C's began in Aug 96, however the conditions as described above apply to all versions of AIM-120 CATM's.

COMMON FIELD-LEVEL MEMORY REPROGRAMMING EQUIPMENT

*Major Robert G Campbell
ASC/YAAS & John Fuqua TAS*

The Common Field-Level Memory Reprogramming Equipment (CFMRE) deployed in support of AIM-120B/C missile reprogramming is being upgraded by Texas Instruments to enhance safety and to make the system more user-friendly.

The new system is scheduled to begin delivery to field units in Oct 96. Field units will return the old system to Texas Instruments via Warner Robins to be retrofitted to the new configuration once a unit receives the new system. This change also makes the CFMRE fully compatible for use by the US Navy.

A new common technical order 33D9-53-108-1 is being developed and the 21-A120A-2 and -3 are being updated. The system will be fully provisioned in Jul 96.

One of the big advantages of the upgraded system is a reduction in the number of field replaceable assemblies and the enhancement of built-in-test (BIT) features. The

new system also monitors power, current, and phase (input and output) at all times and will accomplish a controlled shutdown should any out-of-limit condition occur. It implements a fully automated "wrap" test of the W6/W7 cable for a complete end-to-end check prior to accomplishing any missile BIT or reprogramming actions.

The new system has also been reduced from four to three transit cases and the Junction Box has been eliminated. The new controller is much more user-friendly than the current controller. It weighs only 12 pounds. The screen is easier to read and has hot-keys to adjust the screen brightness (256 discrete levels). The flash cards are easier to insert and remove and the CTRL /ALT/DEL keys are separated.

Altogether, the upgraded CFMRE is a state-of-the-art BIT/reprogrammer for the AMRAAM weapon system. The provisioning has been completed, a VAL/VER has been conducted for the common T.O. and the -2 and -3 T.O.'s. FCA/FQT was conducted at the end of September.

The Navy expects to receive their first deliveries Dec 96. □

TALD HANG FIRE PROCEDURES

NAWCWPNS PT MUGU CA
040048Z NOV 96



Background:

An aircraft recovered with one TALD hung on a BRU-42 certerline. While disconnecting the launch adapter from the BRU-42 breech, the crew member inadvertently removed the launch adapter umbilical connector from the decoy.

Resistance test to vehicle

A resistance test of the Squibs/EEDs and switches, and a complete systems test using the depot level IST tester was conducted. Test findings confirmed resistance test findings that pilot and main battery EEDs were out of tolerance followed by an IST tester systems failure indication code. The following are the recorded findings:

Acceptable EED test tolerances (0.80 to 1.65 ohm)
Gyro-switch and EED (1581)
Gyro-EED only (1581)
Pilot battery-switch and EED (open)
Pilot battery-EED only (open)
Main battery-switch and EED (7100)
Main battery-EED only (7100)
Wing deploy-switch and EED (1.50)
Wing deploy-EED only (1.30)

Conclusions:

The decoy received intent to launch signal from the aircraft and did not launch due to low voltage condition of the pilot battery.

The following are launch sequence anomalies from low battery voltage requirement:

Pilot battery was properly activated by aircraft voltage.

After activation, EED resistance was open.

The gyro EED was not properly activated (low voltage pilot battery). After activation, EED resistance was high (1581 ohms).

The main battery EED was not properly activated (low voltage pilot battery). After activation, EED resistance was high (7100 ohms).

Wing deploy EED was not activated because separation did not occur. EED resistance was good (1.3 ohms).

Recommendations for O/I-level TALD hang fire conditions.

First insure wing safety pin is

installed. Before down loading of decoy standing aft of wing area, do not disconnect umbilical connector at decoy, tape launch adapter assembly to decoy with umbilical still connected to decoy. Complete down load of decoy task. At O/I-level, check if decoy system voltage is present. Connect O/I-level program system tester (go/no-go tester) at J4 receptacle of flight preparation panel and check tester volt meter reading. Zero reading is safe, if meter voltage is indicated position decoy in clear area until voltage is depleted (1 to 3 hours). Annotate discrepancy, test findings to decoy log book and report findings to CFA for corrective action.

The CFA is in the process of updating the O/I-level maintenance manual. □





Atlantic Fleet Aerial Targets Capabilities



The last active LANTFLT A-6E squadron, VA-75, is tentatively planned for decommissioning in February 97, following the current deployment on USS ENTERPRISE. The loss of the A-6 also means the loss of the TACAIR TDU-32 tow and AQM-37C aerial target launch capability for VACAPES and Sixth Fleet training. No alternate launch platform has been identified to date.

At CNO (N880C8) direction, the Navy Standard Tow Target System (NSTTS) that used the RMK 19 and 31 Reeling Machine Launcher System was canceled. At COMNAVAIRLANT request, the NSTTS will continue to be supported at AFWTF by VC-8, until the TA-4J retirement, tentatively planned for FY99. The NSTTS support at Oceana has been terminated and excess support equipment transferred to VC-8. One hundred ninety-two TDU-34 have been authorized for FY97 expenditure, of which 142 are allocated to LANTFLT and RESFOR. TDU-34 tow services in the Puerto Rican OPAREA (PROA) can be scheduled through AFWTF. Three of the six TA-4J aircraft assigned to VC-8 are capable of air launching the BQM-74E target. This capability allows LANTFLT to conserve MK 117 JATO, required for BQM-74E surface launch. VC-8 has the last remaining fleet aircraft capable of launching the AQM-37C aerial target. All 59 AQM-37C allocated

to LANTFLT for FY97 will be launched by VC-8 in the PROA.

AFWTF prepares and repairs all BQM-74E and BQM-34S targets used in the PROA. Both targets are ground launched, but the BQM-74E can also be air launched by VC-8 aircraft. Point of contact for PROA target services is LT Tom Carter, Outer Range Officer (Code 33), commercial (787) 865-7004/5 or DSN 831-7004/5.

VC-6 at NAS Norfolk and the FCTCLANT Dam Neck Detachment is organized with a permanent BQM-74F aerial target launch capability at FCTCLANT Dam Neck that supports VACAPES missile exercises, and three mobile BQM-74E detachments that provide services at remote shore sites and on LANTS capable surface ship. Remote sites currently supported by VC-6 mobile detachments include Wallops Island (NASA range) and the Greek NAMFI range in Souda Bay Crete for deployed Sixth Fleet Battle Groups. Shipboard target services are provided by VC-6 to south American nations during the annual UNITAS operations. VC-6 also supports Fifth Fleet and Third Fleet sponsored missile exercises. Point of contact at VC-6 is LCDR Barbara Righter, Operations Officer (code 20), commercial (757) 444-6793 or

DSN 564-6793. VC-6 can go anywhere, anytime.

LANTFLT was authorized 150 TDU-32 banners for FY97 expenditure. These banners can be towed by F-14 and F/A-18 aircraft for air to air or surface to air gunnery exercises and by VC-8 TA-4J aircraft. Technical assistance in LANTFLT is available by contacting John Olson, COMNAVAIRLANT Target Manager (N85E), commercial (757) 444-7318 or DSN 564-7318.

Aerial Target Maintenance and Documentation.

Section 5 of Volume II of the NAWMP provides a description of aerial targets, describes the three levels of maintenance, and provides mandatory procedures for target documentation. All aerial target capable activities must be thoroughly familiar with both the NAMP and NAWMP policy. Of significance is the target expenditure and inventory requirements. Some fleet activities continue to use OPNAVINST 3110-18S, CINCLANTFLTINST 3600.1A, or COMNAVAIRLANTINST 13150.1E as the reference(s) for reporting. The guidance in these directives has been superseded by

the NAWMP policy contained in Section 5 of Volume II,

(Continued on page 12)

(Continued from page 11)

COMNAVAIRLANT reemphasized correct target reporting procedures in COMNAVAIRLANT Norfolk VA message 280134Z AUG 96. Any questions, contact John Olson at COMNAVAIRLANT commercial (757) 444-7318/DSN 564-7318, or Terri Wertfall at NAWCWPNS Pt Mugu (Code 354010F), commercial (805) 989-5634 or DSN 351-5634.

Recoverable Aerial Targets.

The BQM-74E and BQM-34S are the two recoverable aerial targets available to fleet users. Eighty-five BQM-74E were allocated to LANTFLT for FY97 of which 50 were sub-allocated within NAVAIRLANT. Only 6 BQM-34 were allocated, 2 of which went to NAVAIRLANT. Some confusion exists in the fleet on the meaning of the term "expenditure" when associated with a recoverable target. BQM-74 or BQM-34 is expended only by the target activity (VC-6, AFWTF, NAWCWD Pt Mugu, PRMF, or NAVACT Okinawa). Target users are informed as to whether the target has been expended in the target expenditure report promulgated by the target activity. A target is expended under the following conditions: the target is an operational loss (missile impacts target), target is lost at sea, or the target is recovered but uneconomical to repair. Recovered targets are refurbished by the target activity. Some targets can be refurbished as

many as eight times, others are lost (expended) after only one presentation. Users can continue to schedule aerial target services within their allocation until the target activity expends the target(s) officially. This expenditure information is passed to the user in the aerial target firing report promulgated by the target activity. Watch these reports carefully. Another limiting factor with the BQM-74E target services is the MK 117 JATO NCEA. When the JATO NCEA is expended, the only other launch option is VC-8 TA-4J (LANTFLT), or contract air services from NAWCWD Pt Mugu.(4E). Historically, BQM-74F service life averages three (3) presentations or launches per target before expenditure. The MK 117 JATO requirement (NCEA) is based upon this service life. Unfortunately, under allocation of MK 117 JATO has been a chronic problem. Two JATOs are required to surface launch the BQM-74E. If the target service life is three (3) launches, the requirement is two (2) (JATO) x three (3) launches = six (6) JATO/allocated target. CONNAVAIRLANT was allocated 35 BQM-74E for FY96. The JATO requirement is calculated to be 216 but only 152 JATO were allocated. This shortfall has forced the mandatory use of air launch (VC-8 TA-4J) when operating in the PROA. Target users must ensure that the target and the JATO are not wasted by poor planning. In LANTFLT, we continue to have problems with communication between CVN

(CDC/aircrew and the target activity. Targets can be unnecessarily launched when launch platform systems are not operational because of a communication gap. Ensure your is up, the fire control system is up, the shooter missile is up and the TM is checked telling the target activity to launch the target. Get the word to the aircrew or CDC during missile planning.

Target IR Emitters.

Use of LUU-2 Paraflares for Sidewinder shoots is less than desirable. No further funding of IR flare configured TALD should be expected. The only IR augment available for aerial targets is the MK 28 Mod 3 Target Flare for the BQM-74F- and MJU-28 Target Flare for the BQM-34S. IR augmentation of BQM-34S for Sidewinder is not authorized due to limited targets and target cost. LANTFLT was allocated only 25 MK 28 Mod 3 for BQM-74E. With a four (4) flare per target requirement, only six (6) targets can be IR configured. Eight hundred flares were planned for delivery in FY97 by PMA222, but this batch failed first article test. PMA222 plans production of 400 MK 28 Mod 4 Target Flares later in FY97. Hopefully this will provide a viable target IR source for Sidewinder. CVW Ordnance Officers should contact AFWTF or VC-6 before a missile launch to discuss IR augmentation. Two, vice four, flares per target is an option. □

HARPOON MSI EFFORTS

By Ann Holt



NAWC WPNS DET FALLBROOK was the first site to be trained in the conduct of Harpoon/SLAM MSI by NAWC WPNS Pt. Mugu in

August 1994. MSIs are dockside visual inspections conducted, by the DET at NWS Seal Beach during either offload or onload, in order to "save" as many HARPOONS as possible from being shipped to NWS Yorktown in an unserviceable condition code for unnecessary maintenance. NWS Seal Beach, RSSI personnel, also participate in the MSI.

DET personnel replace various minor parts if needed, e.g., stacking/pivot pins, drain plug assy, caps, grommets, and examine logbooks for BIT test results and MRC compliance. If a missile has failed BIT, the ship is reminded to report the failure by (CODR). Also, if the ship has questions/needs assistance from the CFA, the DET can put them in touch on the spot.

From Aug 94 to Oct 96, the DET has assisted with 33 offloads/22 onloads conducting 425 MSIs. This has resulted in 276 missiles (52 Tartar, 111 Shock Resistant, and 113 Thickwall) or 65% saved. The transportation to ship HARPOON's from NWS Seal Beach to NWS Yorktown is \$3,794

(one to four missiles per load). The same cost is incurred to return to the West Coast after maintenance. Maintenance costs are from \$6065 to \$8195 per missile. Thus, HARPOON MSI savings are major and higher assets readiness figures are undeniable.

NWS, Yorktown DET has since been trained (6/95) and is having similar results! □

Humor Section



Source: "Jackspeak: The Pusser's Rum Guide to Royal Navy Slangage" by Rick Jolly, 1989.

The British Military writes EPR's an officer fitness report. The form used for Royal Navy and Marines fitness reports is the S206. The following are actual excerpts taken from people's "206's":

- His men would follow him anywhere, but only out of curiosity.
- I would not breed from this Officer.
- This Officer is really not so much of a has-been, but more of a definitely won't-be.

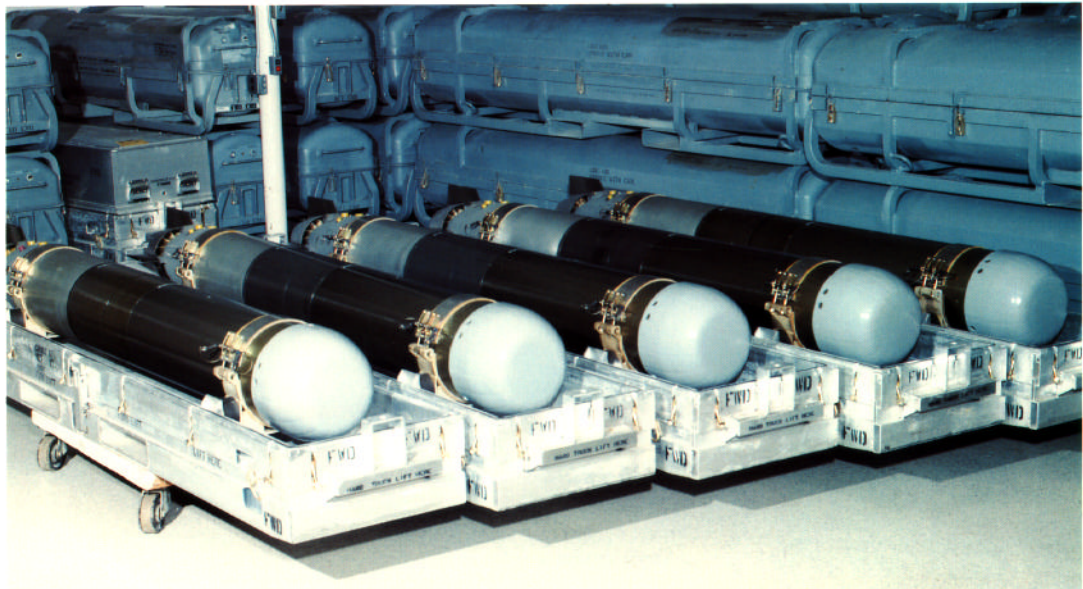
- When she opens her mouth, it seems that this is only to change whichever foot was previously in there.
- He has carried out each and every one of his duties to his entire satisfaction.
- He would be out of his depth in a car park puddle.
- Technically sound, but socially impossible.
- This Officer reminds me very much of a gyroscope - always spinning around at a frantic pace, but not really going anywhere.
- This young lady has delusions of adequacy.
- When he joined my ship, this officer was something of a granny; since then he has aged considerably.
- This Medical Officer has used my ship to carry his genitals from port to port, and my officers to carry him from bar to bar.
- Since my last report he has reached rock bottom, and has started to dig.
- She sets low personal standards and then consistently fails to achieve them.
- He has the wisdom of youth, and the energy of old age.
- This officer should go far - and the sooner he starts, the better.
- In my opinion this pilot should not be authorized to fly below 250 feet.
- This man is depriving a village somewhere of an idiot.
- The only ship I would recommend this man for is citizenship.
- Works well when under constant supervision and cornered like a rat in a trap. □

MK 50 Advanced Lightweight ASW Torpedo

The third-generation lightweight antisubmarine weapon, Torpedo MK 50, was developed in response to the growing hostile submarine threat. It is an entirely new weapon system, specifically designed to counter recent improvements in submarine speed, survivability, depth, and maneuverability. Torpedo MK 50 is the only ASW weapon capable of countering this new generation of threat submarines.

A "fire and forget" weapon, the Torpedo MK 50 has advanced features that include a lethal warhead, greater endurance, sophisticated signal processing, and an enlarged target detection envelope. To further increase its effectiveness, greater search volume and increased countermeasure resistance have been incorporated.

Interoperable with existing Torpedo Mk 46 launch platforms, Torpedo MK 50 is designed to be launched from surface ships, fixed- and rotary-wing antisubmarine aircraft, and submarines. Compatibility with in-place platforms enables the MK 50 to be an extremely cost-effective weapon



system.

Key Benefits

- Interoperable with existing Mk 46 and compatible with all ship and air launch platforms
- Highly effective against all known threats
- "Fire and forget" ASW weapon
- Advanced subsystems
- Deeper, faster, quieter operation than any other lightweight torpedo

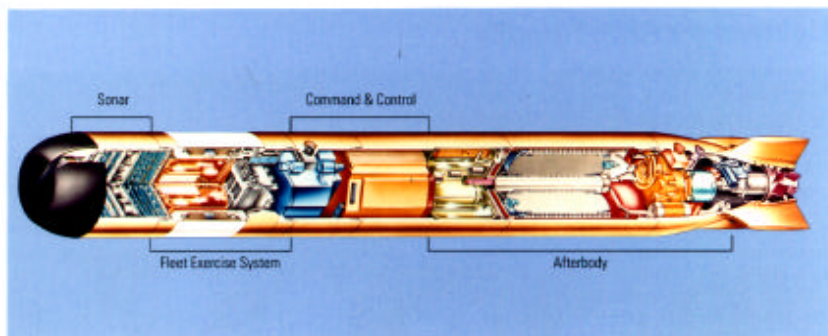
Functional Description

The Torpedo MK 50 subsystems use both new applications of existing technology plus state-of-the-art components. This includes steerable beam sonar, digital guidance and control, and an advanced closed-cycle propulsion system.

Sonar

- Consists of low-noise-array nose assembly, transmitter assembly, receiver assembly, and two digital signal processor

(Continued on page 15)



(Continued from page 14)

assemblies

- Active/passive operation with multiple selectable transmit and receive beams
- Analyzes acoustic returns in real time with Alliant Techsystems digital signal processing units
- Searches for and detects targets faster within greater volumes of water
- Effective in adverse sonar environments

Warhead

- Designed and developed by Naval Surface Warfare Center
- Proven effective against the largest and toughest submarine threats
- Loaded by Naval Ordnance Station, Indian Head, MD

Command and Control

- Commands sonar and propulsion subsystems and provides navigation and attitude control
- Consists of AN/AYK-14 standard Navy computer, attitude measurement unit, and control/communication electronics
- Houses tactical software in the AN/AYK-14, which is responsible for mission control, autopilot navigation and target detection, classification, tracking, and counter-countermeasure tactics
- Contains throughput/memory reserve for future performance growth

Fleet Exercise System

- Replaces warhead section for fleet exercise and proofing runs
- Contains instrumentation that

records extensive torpedo data for further analysis

- Includes buoyancy subsystem to facilitate recovery after in-water exercises

Afterbody and Propulsion

- Uses a stored chemical-energy propulsion system with extremely high-energy density for greater speed and endurance (LiSF₆ chemistry)
- Generates full power at all depths due to closed-cycle, exhaust-free operation
- Is capable of multiple-speed settings as required by the tactical situation □

ROLMS

Effective 01 OCT 1996 the Retail Ordnance Logistics Management System (ROLMS), Fleet Optical Scanning Ammunition Marking System (FOSAMS), and Standardized Conventional Ammunition Automated Inventory Record (SCAAIR) project management office's (PMO) code has changed from 4061 to 4035.

PMO's address is as follows:

COMMANDER
CODE 4035 BLDG 2524
NAVSURFWARCENDIV
300 HIGHWAY 361
CRANE IN 47522-5001 □



RIM - 7P Seasparrow



Multi-Mission Missile

Sparrow is the free world's most versatile medium-range, radar-guided missile, fulfilling the multi-mission requirements of Air Defense, Air Superiority, Ship Self Defense and Ground Low Level Air Defense.

The RIM-7P is the latest version of the Seasparrow surface-to-air missile compatible with the NATO Seasparrow Surface Missile System which is employed by navies throughout the free world for ship self-defense. The RIM-7P can also be ground launched and differs from the air launched version, AIM-7P, only in the configuration of its wings (folded

in RIM-7P), fins (clipped in RIM-7P), and the method of arming the rocket motor (remote). RIM7P can be launched from cells in both trainable and vertical launchers.

RIM-7P Specifications

- **Length:** 12 ft
- **Diameter:** 8 in
- **Weight:** 10 lb
- **Wing Span Open:** 40 in
- **Wing Span Folded :** 25 in
- **Tail Span Clipped:** 24 in
- **Warhead:** 85lbs
- **Rocket Motor:** MK-58 MOD 4
- **Guidance:** Radar, Semiactive

Description

The RIM-7P succeeds its noteworthy predecessor, RIM-7M, as the latest version of the Seasparrow medium range, all weather, all aspect, semiactive radar guided surface-to-air missile. The RIM-7P provides ships with superb self-protection against air attack particularly from sea skimming cruise missiles.

A powerful digital Missile-Borne Computer (MBC) controls overall missile performance and links major missile subsystems. The MBC features Electronically Erasable Programmable Read Only Memory (EEPROM) chips

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which allow the missile to be easily reprogrammed without return to the factory. The new RIM-7P software features advanced guidance algorithms which enable Seasparrow to counter the most formidable threats. Processing speed has been doubled.

Improved Low Altitude Guidance (LAG) Mode makes the RIM-7P exceptionally capable against very low altitude threats. Superior subclutter visibility enhances very low altitude target discrimination in heavy clutter. Additionally, the RIM-7P has proven highly effective in stressing Electronic Counter Measure (ECM) environments.

A truly modern weapon system, the Seasparrow offers growth potential and the ability to cope with changing threats and tactics. The reprogrammable MBC has plenty of extra memory capacity to handle software changes. An uplink capability has been added for midcourse guidance and a digital data bus has been included for

improved fire control system interface. Flexibility and adaptability are key features of the RIM-7P.

Analysis of data from thousands of Sparrow missiles already in the Fleet reveals an outstanding record of reliability. Superior craftsmanship and extensive factory testing ensure superior quality in every missile. In addition, each missile comes with Built-In-Test (BIT) circuitry to enhance maintainability and confirm readiness in the launcher. When seconds count the RIM-7P will be ready.

The RIM-7P is capable of vertical launch through attachment of a Jet Vane Control (JVC) unit. The JVC rotates the missile immediately after it has cleared the ship's superstructure, cancels the missile's initial upward velocity and controls transition to the initial intercept path. Once the seeker is pointing towards the target the JVC is jettisoned. Vertical launch allows the missile to be fired in any direction and eliminates no-fire zones.



Features

- Semiactive
- Medium range
- All weather/all aspect
- Intercept of high to very low targets
- Intercept of supersonic aircraft and missiles
- Intercept of targets in severe ECM environments
- intercept of closely spaced multiple targets
- Intercept of small targets in clutter
- Home on Helicopter mode
- Operational ready rate and reliability double specified requirements □



Final Replenishment Oiler, First Mine Countermeasures Ship Enter Service

Two ships that will play important roles in operating in littoral waters and supporting overseas deployments have entered service. The *USS Inchon* has been recommissioned as a mine countermeasures command, control, and support ship after being converted from an amphibious helicopter assault ship. The 15-month conversion project at Ingalls Shipbuilding, Pascagoula, Mississippi, removed two basic point missile defense Systems, amphibious assault equipment, and a portion of the ship's aviation support facilities.

The ship, MCS-12, will be a support and service platform for Avenger MCM-1 and Osprey MHC- 1 mine warfare vessels. The *Inchon* also will support MH-63E heavy mine countemeasures helicopters. The ship is an integral part of the Navys's mine warfare modernization effort.

In addition, the last 42,000 ton T-AO 187 Henry J. Kaiser class of fleet replenishment oilers entered service. The U.S.N.S. Laramie T-AO 203 is the third of the class built with doublehull sides and bottoms to meet the requirements of the 1990 U.S. Oil Pollution Act. These ships will be the backbone of the Military Sealift Command's replenishment

force for the next 20 years. Its primary mission is providing under way replenishment of fuel and cargo to Navy vessels operating on the high seas. The Laramie can carry 159,900 tons of fuel. □

Joint Vision 2010 Is Blueprint For Services to Assemble Their Next Generation Forces

Gen. Joseph Ralston, USAF, Joint Chiefs of Staff Vice Chairman, told National Defense the new warfighting plan being developed for the U.S. military gives the services a guide to refine their own visions.

Joint Vision 2010 is the view of Joint Chief of Staff Chairman Gen. John M. Shalikashvili, USA. of what will be needed in terms of joint warfighting 15 years down stream. The services will then need to be sure they are structured to support the joint battle 15 years from now," he added.

Although each service is in charge of developing its own outline for the future, the Army, Navy, Air Force, and Marine Corps will certainly be influenced by the interaction at all levels by the joint staff, Gen. Ralston said. □

P2 / HMCM PROGRAM UPDATE

The Pollution Prevention/Hazardous Material Control and Management (p2/HMCM) Program at NAVAIRWARCENWPNDIV, Point Mugu, announces completion of a searchable database which will be added to the EPA's Enviro\$en\$e web site. The database provides the same hazardous material replacement information currently provided by Appendix A, Hazardous Material Cross Reference, of technical manual NAVAIR 01-1A-75.

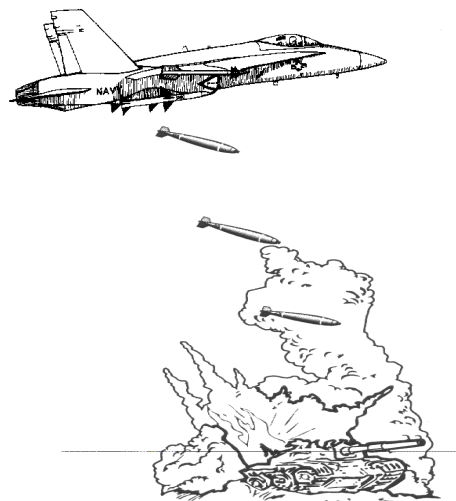
Although originally developed for identifying replacement candidates for use during NAVAIR airborne weapons maintenance, the database will provide useful information for other applications as well. The Airborne Weapons HAZMAT Minimization Database is expected to be accessible by January 1997. Enviro\$en\$e can be accessed at <http://es.inel.gov>. Our point of contact is Ms. Silvia Faulstich, Code 361200E.

Phone (805) 484-6537 or E-Mail faulsts2@qmsmtpgw.mugu.navy.mil.

CONFERENCE

The P2/HMCM Program at NAVAIRWARCENWPNDIV, Point Mugu, held the 2nd Annual HAZMAT Minimization Conference on 10 & 11 December, 1996 at the Holiday Inn, Ventura Beach Resort in Ventura, CA.. The conference discussed HAZMAT issues related to all levels of airborne weapons maintenance. □

Conventional Strike Weapons



TARGET CLASSIFICATIONS

Ordnance can be classified by its capability against the following target characteristics:

HARDNESS: Ultrahard (**UH**)
Hard (**H**)
Medium (**M**)
Soft (**S**)

MOBILITY: Fixed (**F**)
Relocatable - (**R**)
moved after strike
aircraft takeoff
Mobile - (**M**)
moved while being
engaged

SIZE: Point (**P**)
Area (**A**)

Using, these classifications, exemplary target to ordnance matches are as follows:

PRECISION - generally refers to GBUs or AGMS.

ACCURATE - reflects current JDAM capability:

<u>Target Class</u>	<u>Target Type</u>	<u>Weapon</u>
FUHP	Command Bunker	GBU-28
FHP	A/C Shelter/ Bridge	Precision Mk-83/ BLU-109
FHA	Runways	Precision / Accurate Mk-83/84/BLU- 109
FMP	Masonry/ Steel Building	Accurate Mk-83/ 84/ BLU-109 Precision Mk-82/83
FMA	Factory/ Port / RRYard	Accurate Mk-84/ Precision Mk82/83
FSP	Refinery /Intel Bldg	Accurate Mk- 83/84/ Precision Mk-83/84
FSA	POL tanks / fixed SAMs	Accurate Mk-83/WCMD CEM, CBU-87
RSA	AC in open / SAMs	JSOW CEM/JDAM/ WCMD CEM/ CBU-87
RHA CEM/	Artillery / AAA battery	CBU/ MK-20/WCMD Accurate MK-83
RMA	MLRS Site	CBU / APAM/Accurate MK-83/84
MSA	Personnel	CBU / APAM/ MK-80's
MSP	Mobile SSM / Patrol Boat	CBU/ MK-20/ AGM-65/ SFW
MMA	Truck Convoy	CBU / APAM/ MK-80s
MHA	Tank /APC/Platoon	WCMD SFW/ MK-20

WEAPONS COMPONENTS

Dispensers (SUUs)

SUU-30: 1000 lb. Bomblet Dispenser: Dispenser for the CBU-52/58/71

SUU-49: FAE dispenser

SUU-54: 2000 lb. dispenser

SUU-64 Tactical Munitions Dispenser (TMD): Dispenser for the CBU-89/ 97/98

SUU-65 TMD: SUU-64 that spins to aid bomblet dispersal

MK-7: U.S. Navy dispenser designed for shipboard use, dispenser for MK-20 and CBU-59

Submunitions (BLUs)

BLU-61: Softball sized anti-materiel/personnel fragmentation and incendiary bomblet

BLU-63: Baseball sized anti-materiel/personnel fragmentation bomblet

BLU-73: FAE incendiary

BLU-77: APAM anti-personnel/materiel (bomblet)

BLU-86: Anti-personnel/materiel time delay bomblet (time delay- BLU-63)

BLU-91: Gator antitank mines

BLU-92: Gator antipersonnel mine

BLU-97: Antipersonnel/materiel contact/impact bomblet

BLU-108: Antitank bomblet with 4 warheads each

MK-118: Shaped charge submunitions (bomblet)

Warheads (BLUs)

BLU-82: 15,000lb. general purpose bomb developed to create helicopter landing zones in jungle areas. Dropped from the rear cargo doors of C-130 transports.

BLU-107 : Durandal: Anti-runway weapon

BLU-109: Improved 2000 lb. bomb (12K) hard target penetrator

BLU-113: 4000 lb. super-penetrating warhead of GBU-28

Precision Guided Powered Munitions (AGMs)

Precision Guided Powered Munitions include powered and long-range glide weapons with precision (10-20' CEP) capability.



AGM-65 Maverick

Description: The AGM-65 Maverick is the primary U.S. anti-armor guided missile. All variants require initial target designation by the delivery aircraft, but are self-supporting after launch. The A and B variants use TV seekers (restricted to day only) and 125 lb. warheads. The D model uses a IIR seeker, the E model is laser-guided, and the G model uses the D IIR seeker and a much larger (300 lb.) warhead. The D, E, and G models can be used in darkness, but initial acquisition depends on the limitations of the launch aircraft.

Targets: Tanks and other armored vehicles

(Continued on page 21)

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AGM-84E Standoff Land-Attack Missile (SLAM)

Description: The AGM-84E SLAM is the U.S. Navy land attack variant of the AGM-84A-D Harpoon anti-ship missile. The missile uses GPS/INS midcourse and electro-optical terminal guidance to attack targets within a 60 nm range. The Extended Range (ER) variant under development has a 120 nm range.

Targets: Fixed, medium-to-hard point targets

AGM-86 Conventional Air-Launched Cruise Missile (CALCM)

Description: The AGM-86 CALCM is a modification of the earlier nuclear-armed AGM-86B. The Block I CALCM is now fitted with a 1000 lb. blast/fragmentation warhead. The Block II CALCM combines an 800 lb. penetrator with relative GPS guidance (estimated 3-5 m CEP). USAF bombers (B-52, B-1, etc.) launch the AGM-86 CALCM, and the notional range is 600 nm.

Targets: Fixed, medium-to-hard point targets

AGM-88 High-Speed Anti-Radiation Missile (HARM)

Description: The AGM-88 HARM is the standard U.S. anti-radar emitter missile and it is carried by USAF F-16C Block 50s, Navy and Marine F-18s, and the EA-6B. This missile homes in on sources of radar emissions that are detected in flight or set prior to launch (pre-briefed).

Targets: Fire control, early warning, and target tracking radar

AGM-120 Tomahawk Land-Attack Missile (TLAM)

Description: The AGM-120 TLAM is a Navy cruise missile. The TLAM is usually launched from surface ships or submarines, but it also has a demonstrated air-launch capability. The warhead can be cluster, unitary, or penetrator, and the notional range is 1000 nm.

Targets: Fixed, medium-to-hard point targets

AGM-130

Description: The AGM-130 is essentially a GBU-15 with a solid rocket motor and additional guidance logic. This weapon can fly either a low (max. range 15 nm) or medium, (max. 40nm) altitude profile to target. Like the GBU-15 the AGM-130 is carried by the F-15E.

Targets: Fixed, hard point targets

AGM-142 Have Nap

Description: The AGM-142 Have Nap is a 3000lb. standoff weapon carried by the B-52 and it is similar in function and operation to the AGM-130. The AGM-142 can use either EO I or IIR guidance, and its midcourse guidance is provided by an inertial navigation system and is not supported by GPS. The warhead is blast, fragmentation or I-800 penetrator. The I-800 is rated as somewhat better than the BLU-109 due to its higher speed and steeper descent angle.

Targets: Vary depending on warhead

AGM-154 Joint Stand Off Weapon (JSOW)

Description: The AGM-154 JSOW is currently configured as a standoff submunitions dispenser. The base line weapon dispenses BLU-97 combined effects munitions (JSOW-CEM), The second variant dispenses BLU-108 anti-tank SFWs with a CEP of approximately 60'. The third concept could carry either a 500 lb. Blast/fragmentation type or a 1000 lb penetrator unitary warhead. All variants combine GPS and INS in an integrated system. JSOW's advertised range is 40-50 nm at 250 knots.

Targets: Vary depending on warhead type

Precision Guided Glide Munitions (GBUs)

Guided Bomb Units (GBUs) are classified as either "precision" (10-20' CEP) or "accurate" (40' CEP). GBUs feature either laser, imaging infrared, inertial, or electro-optical guidance. Precision weapons provide the accuracy required to destroy point targets, but at the added costs of requiring (in most cases) man-in-the-loop control and guidance systems. Laser guided bombs (LGBs) incorporate a terminal seeker (Paveway) that responds to reflected laser radiation. Laser designators, which can be ground based, mounted on the launch platform, or another aircraft (a.k.a. "buddy lasing"), illuminate the target with 1.06 micron radiation. Airborne designators such as PAVE TACK or LANTIRN can acquire targets out to 20-25 nm under good atmospheric conditions. Reflected radiation is detected by the weapon seeker head, and the weapon control fins adjust to aim the weapon at the target. LGB accuracy is listed as ten meters, but better accuracy, has been obtained operationally.

GBU-10

Description: The GBU- 10 is a 2000 lb. LGB that uses the Paveway I or II Guidance package. The weapon can use a MK-84 GP Bomb or a BLU-109 2000 lb. penetrating warhead (12K).

Targets: Fixed, hard point targets

GBU-12

Description: The GBU-12 is a 500 lb. MK-82 LGB that uses the Paveway I or II guidance package.

Targets: Fixed, soft-to-medium point targets

GBU-15

Description: One version of the GBU-15 is an electro-optical guided weapon, while a second version is an imaging infrared (IIR) guided weapon. Carried by the F-15E, the GBU-15 can employ either the MK-84 or the BLU-109 12K.

Targets: Fixed, hard point targets

GBU-16

Description: The GBU- 16 is a 1000 lb. MK-83 LGB that uses the Paveway I or II guidance package. Since the MK-83 is used mainly by the U.S. Navy, the GBU-16 is a Navy-only weapon.

Targets: Fixed, medium-to-hard point targets

GBU-24

Description: The GBU-24 is a MK-84 LGB which uses a Paveway III laser guidance system. The Paveway III uses proportional navigation guidance. This guidance, coupled with larger control fins, allows the GBU-24 to be delivered from low altitude. The GBU-24B employs a MK-84 warhead, and the GBU-24A/B employs a BLU-109.

Targets: Fixed, hard point targets

GBU-27

Description: The GBU-27 is a BLU-109 LGB specifically designed for the F-117. This weapon's control unit has smaller control fins to allow for carriage in the F-117's internal weapons bay. The GBU-27 is designed for high altitude delivery.

Targets: Fixed, hard point targets

(Continued on page 23)

(Continued from page 22)

GBU-28

Description: The GBU-28 is a 5000 lb. laser-guided hard target penetrator which uses the 20' long BLU-113 "Bunker Buster" Super Penetrator warhead. The BLU-113 was developed for use during Operation Desert Storm. With the retirement of the F-111, the only aircraft in U.S. inventory capable of carrying this weapon is the F-15E.

Targets: Fixed, ultra-hard point targets

GBU-29 through GBU-32 Joint Direct Attack Munition (JDAM)

Description: JDAM is a 2000 lb. short standoff range weapon with a GPS/INS guidance and control kit built into the tail unit. The specification glide range is approximately 12-15 nm. JDAM can be employed with either the MK-84 GP bomb or the BLU-109 12K as its warhead. A 1000 lb. MK-83 variant is under development. An "accurate" as opposed to "precision" weapon, JDAM advertised CEP is 13 m. The JDAM Product Improvement Program (PIP) is intended to provide precision capability.

Targets: Fixed or relocatable, medium-to-hard, small area targets

Free Fall Cluster Munitions (CBUs)

Cluster Bomb Units (CBUs) are free fall canisters that dispense a variety of submunitions. These canisters are intended to saturate areas of small targets that are difficult to engage individually. Small targets include troop concentrations, truck parks, aircraft in parking areas, and fuel storage facilities. CBUs generally require overflight of the target, usually at low altitude due to wind, ballistic, and release error. Survivability considerations of lower altitude delivery have led to the development of the Wind Corrected Munitions Dispenser (WCMD), a tail kit that can be retrofitted on the CBU-87, 89, and 97. WCMD provides a medium to high altitude release capability by detecting wind shifts during weapon descent and correcting the flight path accordingly. WCMD advertised capability is a 45' CEP.

CBU-52

Description: The CBU-52 is an SUU-30 dispenser containing 21 BLU-61 anti-materiel/ personnel bomblets.

Targets: Materiel and personnel

CBU-58

Description: The CBU-58 is an SUU-30 dispenser containing 650 BLU-63 anti-materiel/personnel bomblets.

Targets: Materiel and personnel

CBU-59 APAM

Description: The CBU-59 A-PAM is an MK-7 dispenser containing 717 BLU-77s, which are anti-personnel/materiel bomblets with two modes of operation. When a bomblet impacts a hard surface, it immediately fires a shaped, armor-piercing charge. If the bomblet impacts a soft surface (such as the ground), the body and tail will bounce up to a height of two to ten feet before detonating. The CBU-59 APAM is employed by the U.S. Navy.

Targets: Materiel and personnel

(Continued on page 24)

CBU-71 APAM

Description: The CBU-71 APAM is an SUU-30 containing 650 BLU-86 anti-personnel/ materiel time delay bomblets.

Targets: Materiel and personnel -- area denial

CBU-72 Fuel-Air Explosive (FAE)

Description: The CBU-72 FAE is an SUU-49 dispenser containing fuel and three BLU-73 incendiaries. This weapon was developed to replace napalm.

Targets: Materiel and personnel in forested areas, revetments, and shelters

CBU-78/89 Gator

Description: The CBU-78 Gator uses an SUU-58 dispenser, while the CBU-89 Gator uses an SUU-64 dispenser. These dispensers contain BLU-91 antit-personnel mines and BLU-92 anti-personnel mines. The U.S. Navy CBU-78 carries 45 and 15 of these mines respectively. while the USAF CBU-89 carries 72 and 22. BLU-91s are shaped charges that detonate when larue metal objects (such as an approaching tank) are detected. BLU-92s contain four fragmentation warheads that spring radially outward upon contact with the ground and deploy trip wires.

Targets: Materiel and personnel -- area denial

CBU-87 Combined Effects Munition (CEM)

Description: The CBU-87 CEM is an SUU-65 dispenser containing 202 BLU-97 multipurpose bomblets, each about five to six inches in length. This contact-fuzed charee can penetrate three to four inches of rolled steel. and it also has an incendiary effect. As a bomblet descends. a small parachute attached to each one all-ns the charge vertically. A Wind Corrected Munitions Dispenser (WCMD) inertial-aided variant for hieih-altitude delivery of cluster munitions is under development.

Targets: Materiel and personnel

CBU-97 Sensor Fuzed Weapon (SFW)

Description: The CBU-97 SFW is an SUU-64 dispenser containing ten BLU-108s with four 4 “skeet” antitank- warheads each. As the dispenser breaks apart, each BLU 108 separates and deploys a retarding parachute to orient the submunition vertically. At a preset height the parachute is jettisoned. and an explosive charge boosts the submunition hi-her and causes it to spin. The four Explosively Formed Penetrator warheads are then shot outward. These warheads incorporate infrared sensors and home in on heat sources such as tank engine bays. A WCMD variant is under development.

Targets: Tanks and other armored vehicles

MK-20 Rockeye

Description: The MK-20 Rockeye is an MK-7 dispenser containing 247 MK-118 shaped charge submunitions. These bomblets are larger and heavier than BLU-77s and are designed primarily for anti-armor operations. Each bomblet can penetrate up to six inches of armor plate.

Targets: Tanks and other armored vehicles

Free Fall Unitary Munitions

Free Fall Unitary Munitions are general purpose weapons that are carried by almost all strike aircraft.

Most of the munitions are warhead components for more advanced guided weapons.

The MK-80 series of low drag bombs has been the standard U.S. free fall weapon since the mid-1960's.



The non-streamlined M-117 is still carried by the B-52, but in decreasing numbers.

MK-82

Description: The MK-82 is a 500 lb. General Purpose (GP) Bomb with 35% explosive weight. This bomb can be fitted with a BSU-49 air-inflatable retard or MK-15 Snake-Eye (SE) fins for low-level delivery. A modification of the MK-82 is the MK-36 Destructor (DST), an MK-82 equipped with a time delay or a disturbance fuze. The MK-36 DST is employed as an aerial mine. The U. S. Navv BLU-111 is an MK-82 with a PBXN-109 explosive.

Targets: Medium-to-soft area targets

MK-83

Description: The MK-83 is a 1000 lb. GP Bomb with 45% explosive weight. This bomb can be fitted with the BSU-85 Ballute (balloon-parachute combination) for low-level delivery. This weapon is used primarily by the U.S. Navv because of the difficulty of handling larger bombs aboard aircraft carriers. The U.S. Navv BLU-110 is an MK-83 with a PBXN-109 explosive.

Targets: Medium-to-soft area targets

MK-84

Description: The MK-84 is a 2000 lb. GP Bomb with 50% explosive weight. This weapon can be fitted with the BSU-50 Ballute for low-level delivery.

Targets: Hard-to-medium area targets

M-117

Description: The M-117 is a 750 lb. GP Bomb used by the USAF, and it is usually dropped by the B-52. This bomb can be fitted with the BSU-93 for low-level delivery.

Targets: Medium-to-soft area targets □

New Family Of U.S. Military UAVs Takes Shape

The U.S. Navy led the other military services in exploiting the potential of unmanned aerial vehicles (UAVS) when, in the late 1980s, it deployed the first operational system, the Pioneer UAV. UAVs have now gained wide acceptance within the services after demonstrating their military usefulness as unmanned reconnaissance platforms.

The Pioneer, first delivered in May 1986, provided highly successful reconnaissance support for U.S. forces during the Gulf War, when six Navy, Marine, and Army Pioneer vehicles flew more than 300 combat missions. The Pioneer also flew surveillance missions over Somalia, Haiti, and Bosnia during the past two years. As a result of the cancellation of the Hunter joint tactical UAV program last year (because of a series of crashes and cost overruns), the Pioneer is expected to remain in the Navy and USMC inventories until about 2004 and possibly beyond.

The Pioneer is manufactured by Pioneer UAV Inc., a jointly owned company, formed by Israel Aircraft Industries (IAI), the original developers of the system, and AAI Corp. Final assembly is done at AAI's facility in Hunt Valley, Md.

The Veteran Pioneer

The 14-foot-long Pioneer air vehicle is powered by a two-cylinder pusher-propeller engine. It can stay aloft five hours at



altitudes up to 15,000 feet and cruise at up to 65 knots; its mission radius is about 100 nautical miles. The air vehicle carries either a daytime TV camera or a forward-looking infrared (FLIR) night sensor. It is capable of transmitting surveillance video imagery in real time through a two-way radio data link to its ground control station (GCS). An operator in the GCS controls the flight of the air vehicle with a joystick. Nine Pioneer systems, each with five air vehicles, are currently fielded. Five are in use with the Navy and three with the Marine Corps; one is used as a training system.

The Navy operates the Pioneer afloat from three amphibious dock landing ships (LPDs) - *USS Austin*, *USS Denver*, and *USS Shreveport* - each of which launched Pioneers on surveillance missions over Bosnia during the past two years. The Pioneers use rocket motors for launch from the ships, and are recovered by a net rigged on the aft end of the ship. Current Navy plans call for outfitting three more LPDs for

Pioneer operations; funds for the first conversion are expected to be included in the fiscal year 1998 defense budget request. Barry Dillon, director of the Navy-led UAV Joint Project Office (JPO), said the Pioneer probably will continue in service with the Navy as long as the LPDs remain in the inventory.

Crashes and CARS

Engine failures, which caused two crashes of Marine Pioneers last July in Bosnia, have been a recurring problem with the Pioneers. Because of the crashes, and the extension of the Pioneer's planned service life, the Navy and Marine Corps are fielding a more reliable version of the same engine, which will be replaced every 30 flight hours.

The failure rate of the new engines, up to 30 flight hours of operation is less than one percent. Pioneer has logged a total of more than 15,000 flight hours. Less than one percent of the mishaps occurred when using an engine with less than 30

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hours on it.

The Pioneer also has suffered a number of mishaps during operator controlled landings. To overcome that problem, the UAV JPO plans to retrofit the Pioneer systems with a common automatic recovery system (CARS) developed by Sierra Nevada Corp. The CARS consists of an airborne beacon - a small box about the size of a cigarette pack in the air vehicle-and a millimeter-wave radar tracking antenna on the ground. The CARS will keep track of the air vehicle's position and send it glide-slope control signals for automated landings, enabling the Pioneer to land safely in fog and other adverse weather.

Tactical UAVs OTH

The Army, Navy, and Marine Corps are pinning their hopes on the Alliant Techsystems' Outrider for an affordable new joint tactical UAV that can conduct short-range reconnaissance. An Alliant-led team won a competitive contract last May to supply six systems, each with four air vehicles and a ground control station, for a two-year advanced concept technology demonstration (ACTD) program. The first acceptance flight of Alliant's dual-wing Outrider, designed for short takeoffs from, and landings on, ship flight decks or unimproved land surfaces, was scheduled for the very near future, officials said.

If the Outrider proves out and enters production, it ultimately will replace Navy and Marine Pioneer systems and will operate from the Navy's large-deck amphibious ships

(LHAs and LHDS). Cost is a key consideration: the 33rd production air vehicle, with sensor payload, must cost no more than \$350,000 and the 100th vehicle no more than \$300,000, according to the planned contract specifications.

Alliant says the Outrider will have a range of 108 nautical miles and will be able to loiter nearly five hours (exceeding the three-hour requirement) at that range, or more than seven hours at 27 nm. The air vehicle is nearly 10 feet long and has a wing-span of about 11 feet. It will take off, fly, and land automatically without a launcher or recovery gear, and will cruise at about 90 knots at altitudes up to 15,000 feet.

The Outrider will be powered by a four-cylinder McCulloch engine, over 75,000 of which have been produced to date for light-aircraft. The engine, now gasoline-powered, is being converted to a true diesel to allow it to run on the heavy fuels used by jet aircraft and military \ vehicles, rather than on the more volatile aviation gasoline.

The Outrider air vehicle is based on the Vixen, designed by Mission Technologies Inc. of Hondo, Texas, and will be manufactured for Alliant by Cirrus Design of Duluth, Minn. The air vehicle, which has 10 modular pieces, can be assembled by two people in a short time. It will carry a sensor payload, built by IAI Tamam, that includes a color-charged coupled-



Outsider Joint TAUU

device camera and a co-aligned FLIR.

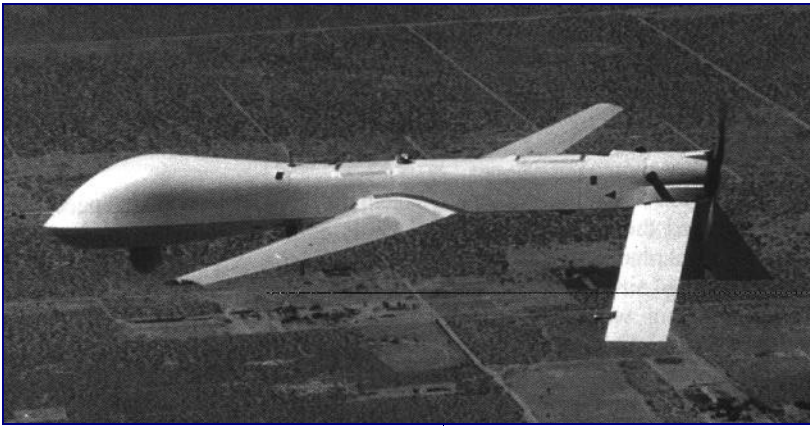
The complete Outrider system and six-person crew will be carried on two Humvee trucks and one trailer, which will fit in a single C-130 aircraft.

The purpose of the ACTD is to place the system in the hands of operational users as quickly as possible. The tactical UAV's requirements will evolve as we apply lessons learned to provide a more effective and suitable system. The Army will receive the first Outrider system for user evaluations in June 1997 and a second in January 1998; the Navy will receive a single system in September 1997, and the Marine Corps will get one two months later. At the completion of the ACTD, the decision will be made to enter low-rate initial production.

Low rate production of the Outsider could begin in 1998, with operational testing completed the following year. The three services plan to buy a total of 61 systems and 244 air vehicles; the

Army would receive 38 systems, the Marine Corps 11, and the Navy eight, with four set aside for

(Continued on page 28)



The Predator during a test flight

(Continued from page 27)
training.

Air Force UAV Support

Navy and Marine forces also will benefit from surveillance video imagery provided by DOD's only other current tactical UAV, the General Atomics Predator,, which has performed impressively during the past 18 months in near-daily reconnaissance missions over Bosnia. Operational control of the Predator long-range/medium-altitude endurance UAVS, which were developed and fielded under an ACTD program by the UAV JPO, transitioned in October to the Air Force's Air Combat Command's new 11th Reconnaissance Squadron at Nellis Air Force Base, Nev. Predators will continue to support operations of the other services, however. Ironically, because the Navy manages the UAV JPO, the Predators destined for the Air Force were funded by Congress in the Navy 's FY 97 budget.

The Predator air vehicle is 28 feet long and has a wingspan of 49 feet. It can stay airborne more than 40 hours, or loiter for 24 hours, at

altitudes up to 26,000 feet, over an area 500 nm from its launch point. Its cruise speed is 70 knots, its maximum speed 120 knots. The Predator payload consists of TV and IR sensors for day/night missions and a Northrop Grumman synthetic-aperture radar (SAR). The SAR can provide extremely-high-resolution all-weather images from altitudes above 15,000 feet.

The Predator air vehicle transmits continuous TV/IR video to its ground station using a line-of-sight radio data link out to 150 nm or can send still frame TV/IR images via satellite links. For operations beyond the line of sight, a commercial satellite communications data link is used both to control the air vehicle and to transmit continuous video or SAR still-frame images.

SEALs and Silkworms

A Navy at-sea exercise of a Predator air vehicle, carried out in early June, demonstrated for the first time the ability of an underway submarine to directly control a UAV for over-the-horizon surveillance. A Predator was launched from San Clemente

Island, off the southern California coast. and the submerged Los Angeles-class nuclear-powered attack submarine USS *Chicago* then assumed tactical control of it. The *Chicago*, which operated at periscope depth, was equipped with a mini ground station and a small, mastmounted antenna. The advanced-technology antenna had the high-data-rate capability required to receive Predator video imagery via line-of-sight radio link.

The submarine received open-ocean and land area surveillance imagery in real time from the Predator, which flew at an altitude of 25,000 feet, dramatically enhancing the submarine's ability to see over the horizon.

The Chicago also used Predator imagery to support a SEAL (sea-air-land) commando team, which went ashore from the submarine to knock out a simulated Silkworm missile site on San Clemente Island. With the Predator monitoring hostile forces and locating the Silkworm site, submarine personnel advised the SEALs by voice radio of the site's location. The submarine also transmitted still images, via satellite, to a simulated joint task force headquarters.

High-Altitude Endurance UAVs

The Defense Advanced Research Projects Agency (DARPA) is developing DOD's two new high-

altitude endurance (HAE) UAVS: Teledyne Ryan Aeronautical's very large Global Hawk and Lockheed Martin-Boeing,'s smaller, stealthy DarkStar vehicles.

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The differences between DOD's tactical and HAE UAV systems as follows: The latter are theater-level assets and are to be controlled predominantly by JTF commanders ... [for] high-resolution broad-area surveillance ... [through] digital (still-frame) imagery. The tactical UAVs will be controlled by lower echelons, and will provide predominantly video imagery for narrower, more-focused coverage.

The HAE UAV systems are designed to be relocatable, but will operate primarily from fixed bases; the tactical systems "are designed to be fully deployable."

The Global Hawk and DarkStar, each of which will have an air vehicle cost ceiling of \$ 10 million (in FY94 dollars), are designed to be complementary. The Global Hawk is optimized for long-endurance surveillance missions in low-to-moderate threat environments in which range, endurance, and continuing consistent coverage are paramount. The DarkStar vehicle incorporates stealth low-observable features, and is optimized for moderate-endurance, high-altitude reconnaissance missions in high-threat environments in which survivability is more important than



Prototype of the Global Hawk high-altitude endurance UAV

range and endurance. The two air vehicles will use a common ground station, now being developed by Raytheon E-Systems' Falls Church (Va.) Division.

The first flight of Teledyne Ryan's Global Hawk is scheduled for early February. The first DarkStar air vehicle crashed on takeoff during its second flight test last April; the next test, with a backup vehicle, is planned for March or April. Both HAE UAVs are currently in Phase II flight testing, which runs through the end of next year. Phase III, which will run for two years, will focus on field demonstrations for operational users.

Global Hawk will be the largest operational UAV ever produced, with a 116-foot wingspan and a

44-foot length. It will be able to fly to a target area 3,000 nm from its point of launch, loiter for 24 hours, then return, staying aloft for as long as 42 hours. Powered by a single Allison AE3007 turbofan engine, it will cruise at nearly 350 knots at an altitude of 65,000 feet. The Global Hawk's 2,000-pound payload suite will include TV, IR, and SAR sensors. Hughes Aircraft is developing the sensor suite, which will have enough capability for high-resolution surveillance data to map the entire state of Indiana in a day.

The DarkStar has a 69-foot wing, and is one-third as long as the Global Hawk. It will fly (at a speed of 300 knots and an altitude of about 45,000 feet) to a target area 500 nm from its launch point, then loiter for more than eight hours.

(Continued on page 32)

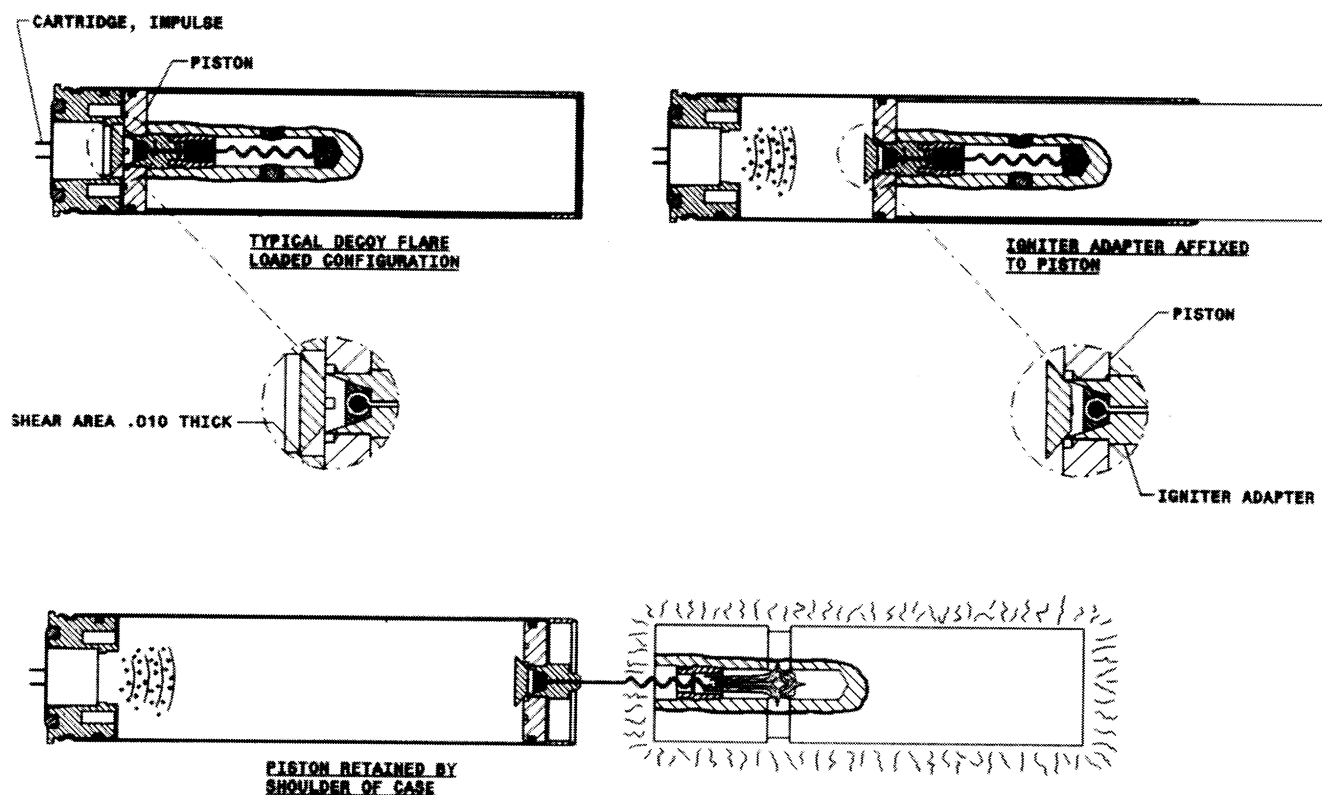


The stealthy Dark-Star HAE UAV during a successful first flight

AIRBORNE EXPENDABLE COUNTERMEASURES

The next generation of airborne expendable infrared countermeasures will begin showing up in inventory this fiscal year. In addition to lowering the cost of manufacture, handling safety has been significantly improved in these new decoys. You will soon see the MJU-32/B (LA01) and MJU-38/B (LA02) Decoy Flares, direct replacements for the MK 46 Mod 1C (LW60) and MJU-8A/B (2W89) respectfully. These flares no longer have a pull wire igniter, but rather a new ignition train which requires hot particles from the impulse cartridge. Once the unit is ignited, all the same dangers and benefits exist. The units are also sealed with an o-ring on the closure end cap eliminating the less reliable RTV (Room Temperature Vulcanizing) sealant. This improves the environmental durability of the decoy. Below is a pictorial representation of the sequence of events of both present and the new decoy flares.

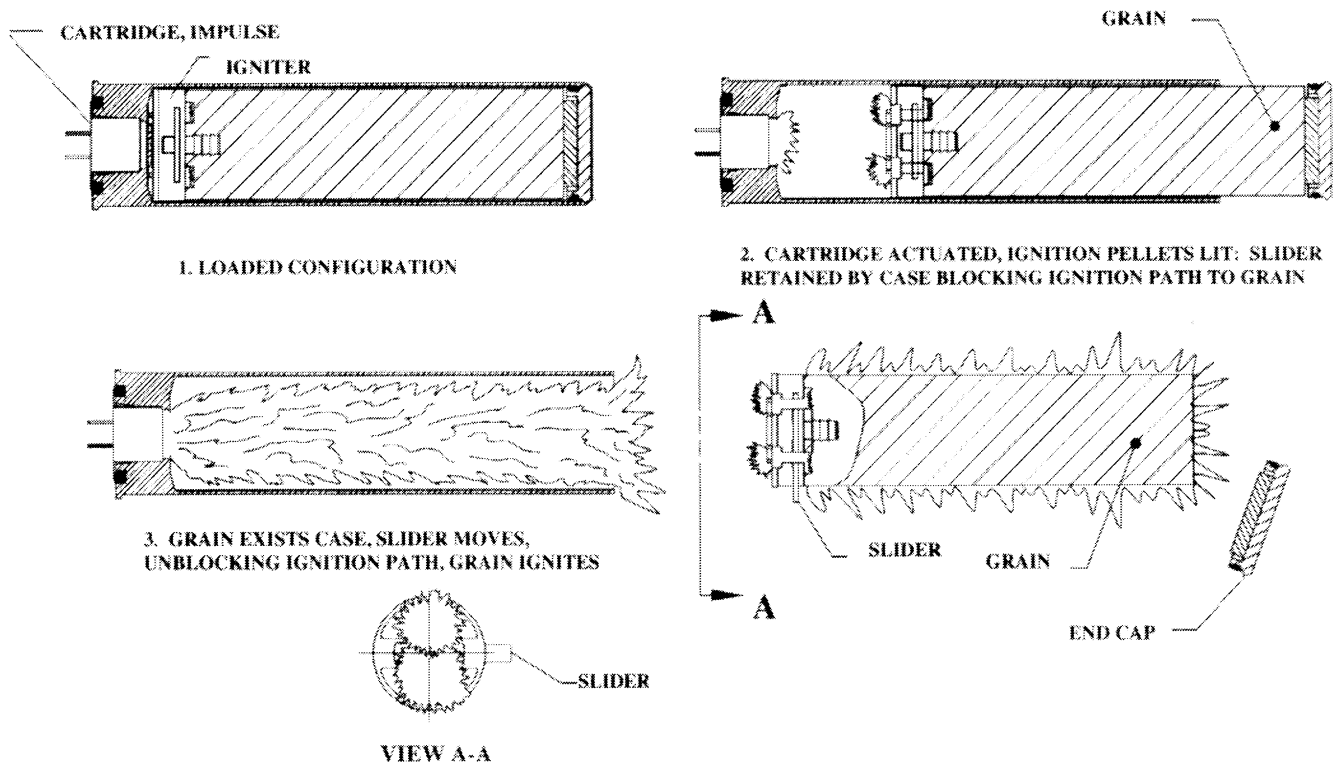
MK 46 MOD 1C & MJU-8A/B FUNCTIONAL SEQUENCE



The current decoy flares (Mk 46-1C, MJU-8A/B and MJU-22/B) have a common functional sequence and common ignition mechanism. As the impulse cartridge fires, gas pressure breaks the case seal and allows hot particles to vent into the payload cavity. This action activates the igniter mechanism which operates much like striking a match once the piston reaches the end of the flare case and stops. These flares incorporate a fail safe design to prevent ignition without impulse cartridge function, however, the potential for ignition is always present, even in the absence of the impulse cartridge. A training video exists called "HANDLE FLARES WITH CARE" and should be viewed by all ordnance handlers, ask your training coordinator.

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MJU-32/B AND MJU-38/B FUNCTIONAL SEQUENCE



(Continued from page 30)

As the impulse cartridge fires, gas pressure breaks the case seal and allows hot particles to vent into the payload cavity. Two ignition pellets at the base of the flare are ignited as the flare begins to exit the case and push off the end cap. As the flare exits the case a barrier is removed between the ignition pellets and the flare and total ignition occurs instantly.

More B/S (tips from Burl and Steve) will appear in future issues. The tip for this issue is [read your tactics recommendations](#) before deployment (including OTG TZ3431-03-95 for Surface to Air Infrared Missile Threats and AZ3202-05-95 for Air to Air Infrared Missile Threats). Survival measures became more complicated when threat missile got smart. Lots of work went into improving survivability both from the decoy and the deployment standpoint, don't ignore your advantage. Here are some program points of contact if you ever want help:

Mr. Bill Rock	Deputy Program Manager :	(904) 772-2751 ext 168
Mr. Burl Phillips	Class Desk for Expendable Countermeasures:	(904) 772-2751 ext 163
Mr. Steve Norris	Navair Technical Lead for IR Countermeasures:	(812) 854-2859 ☐

(Continued from page 29)

The DarkStar will carry a 1,000 pound payload, either a Recon Optical TV sensor or a Northrop Grumman SAR.

Novel Payloads

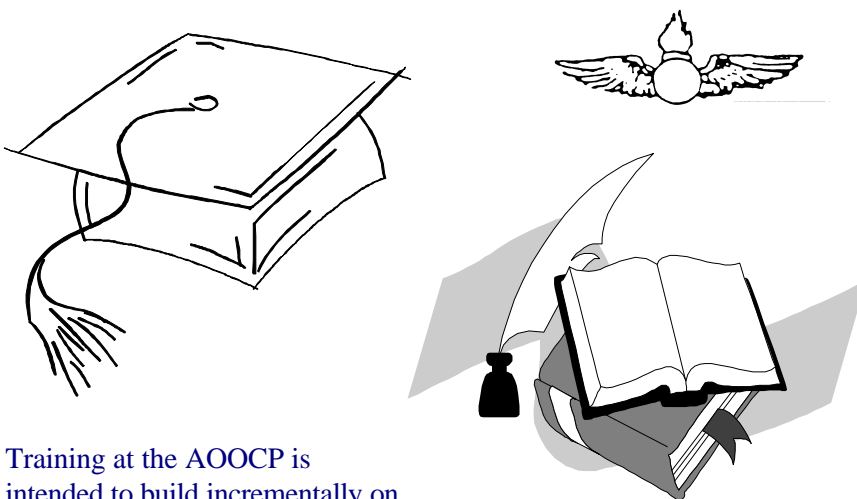
The potential military applications of UAVs, particularly relatively cheap ones like the new Outrider are "virtually unlimited," program officials say.

The Marine Corps recently demonstrated a novel use of UAV's - to provide a standoff crowd control capability in low-intensity conflicts, such as the U.S. military operations in Somalia and Haiti.

In a series of tests this fall at Edgewood Arsenal Maryland, and with the Army's 101st Airborne division at Fort Campbell, KY., remotely controlled Marine Corps EXDRONE (expendable drone) UAV's successfully dispensed nonlethal riot-controlled irritants over a target area from altitudes of 150 to 200 feet. The UAVS. fitted with forward and down-looking cameras, dropped cartridges containing liquid pepper spray, high-decibel ascoustic whistles, and tetrahdral anti-tire spikes. The test were sponsored by the Commandant's Warfighting Laboratory. □

AOOCP FY97 CLASS SCHEDULE

NAVAVSCOLSCOM 101619Z DEC 96



Training at the AOOCP is intended to build incrementally on previously acquired skills and provide the necessary education to enhance the various professional career paths for Aviation Ordnance Officers. The training is available to senior USN/USMC enlisted personnel and is highly recommended for those personnel serving in staff billets.

AOOCP Class schedule and quota availability for FY97:

Class Number	Conv. Date	Grad. Date	Levels
97-030	13 Jan 97	24 Jan 97	II
97-040	18 Feb 97	28 Mar 97	I
97-050	21 Apr 97	02 May 97	II
97-060	09 Jun 97	18 Jul 97	I
97-070	04 Aug 97	15 Aug 97	III
97-080	08 Sep 97	10 Oct 97	I

QUOTA CONTROL: NAVAVSCOLSCOM, Pensacola, FL (Code 055)

POC: CWO4 M. Pawless/DSN 922-8626 or DSN 922-4230 □

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FAX: (703) 604 - 3157/ 604 - 3241

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3.1.1B	ASST FLEET WPNS SUPPORT	LCDR ERIC TREXLER	604 -3200 X6541
3.1.1BA	BFM FOR WEAPONS	DEBBIE JOHNSON	X6561
3.1.1S3	SECRETARY	DONNA SCOTT	X6536
3.1.1L	<u>AIR-TO-AIR BRANCH HEAD</u>	EDNA ALLEN	X6532
3.1.1L	SPARROW APML	RON PHILLIPS	X6506
3.1.1L	SPARROW FMS APML	CHRIS HOOVER	X6531
3.1.1L	SPARROW FMS APML	DENISE BRADY	X6566
3.1.1L	SEA SPARROW DAPML	MARK PAVLIN	X6568
3.1.1L	SIDEWINDER APML	TRENT MITSCH	X6526
3.1.1L	SIDEWINDER DAPML	KAREN CHRISTIAN	X6505
3.1.1L	SIDEWINDER FMS APML	JIM ELLIOTT	X6504
3.1.1L	SIDEWINDER FMS DAPML	DAVID HENRY	X6571
3.1.1L	SIDEWINDER FMS DAPML	RANDY SCHNOEBELEN	X6523
3.1.1L	SIDEWINDER FMS BFM	CAROL ECK	X6546
3.1.1L	AMRAAM APML (EGLIN AFB)	JOHN PALIOTTA	(904) 882-9456 X255
3.1.1L	PHOENIX (PT MUGU)	EVERETT WALLACE	(805) 484-6335
3.1.1K	<u>DEF SUPP/STRIKE WPNS BR HD</u>	VACANT	
3.1.1K	HARM APML	ILDEGARDO OLEA	604-2340 X3203
3.1.1K	HARM FMS APML	BOB WHITE	X6537
3.1.1K	JSOW APML	PRISCILLA (DUNN) PLAUTZ	X6529
3.1.1K	JSOW DAPML	LT JACKIE CRUSE	X6569
3.1.1K	JSOW INTERN	KEN SAVASAAR	X6549
3.1.1K	ADV ROCKET SYSTEM APML	KRISTIN STITH	X6509
3.1.1K	BOMB RACKS APML	RICHARD BROWN	X6519
3.1.1K	GBU-24/JDAM APML (EGLIN AFB)	JOHN MELICHAR	(904) 882-9583 X3238
3.1.1K	MAVERICK/SIDEARM APML (PM)	DAN CHEEK	(805) 484-6290
3.1.1K	TOW/HELLFIRE APML (PT MUGU)	BOB NEUNESB	(805) 484-6593
3.1.1K	WALLEYE APML (NAWC IND)	WAYNE WARD	(317) 306-3716
3.1.3	<u>APEO(CU) LOGISTICS</u>	DON FELLOWS	X6516
3.1.3C	RESOURCE MANGER	RICK FERGUSON	X6517
3.1.3.1	<u>MISSILES/UAV/TARGETS BR HD</u>	CHARLES MOORE	X6513
3.1.3.1	TARGETS/TALD APML	DAVE STIFLE	X6538
3.1.3.1	PENGUIN APML	DON MILLER	X6543
3.1.3.1	PIONEER APML	CAPT VERN CALDWELL	X6572
3.1.3.1	SLAM/SLAM-ER APML	CYNTHIA MURPHY	X6553
3.1.3.1	HARPOON APML	ED WERKMESTER	X6524
3.1.3.1	HARPOON FMS APML	JERRY TAYLOR (ACTING)	X6539
3.1.3.1	HARPOON FMS	DEAREA ALLEN	X6573
3.1.3.1	HARPOON FMS	MARY FELDMAN	X6558
3.1.3.1	HARPOON FMS	VACANT	

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HARM	M.PATTERSON	311000E	6303
HARPOON	D. BOEMMELS	313000E	6203
HELLFIRE	B. NEUNES	311000E	6593
MAVERICK	D.CHEEK	311000E	6290
PENGUIN	T. BLATTEIL	313000E	6552
PHOENIX	E. WALLACE	311000E	6335
PIONEER	K. BURCH	313000E	6523
SIDEARM	D.CHEEK	311000E	6290
SIDEWINDER	J. MCLAUGHLIN	311000E	6377
SKIPPER/LGB/GBU	S. MOREAU	311000E	6230
SLAM	D. BOEMMELS	313000E	6203
SPARROW	D.DUNCAN	311000E	6362
TALD	J. WHEAT	311000E	5603**
TARGETS	J. GARLARDO	323010E	4059**
TOW	B. NEUNES	311000E	6593

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AWW-13 PODS	JOE STUDER	11X134	4701
AWW-13 PODS	DENNIS STOUT	3.1.2	4783
LAU-7/LAU-138/HI-PAG6	CHRIS HASLER	312000C	7979
LAU-1 15/116/117/118	PHILL POTAMPA	312000C	7983
BRU-20/41/42/MER/TER	PHILL POTAMPA	312000C	7983
BRU-32/BRU-33/LAU- 127	RON BROWN	312000C	3856
BRU-10/1 1/12/14/15/36	LCDR BILL MORGAN	321000C	3971
LAU-92/93/1-'12	LCDR BILL MORGAN	321000C	3971
AERO-7/20/27/65/PMBR	JOHN MASCHMEYER	323000C	7984
MK-8/TALLEY	JOHN MASCHMEYER	323000C	7984
M272/M299/ADU-299/TML	TOM SMAY	323000C	7115
ADU-703/MXU-611/711	FRANK BERTRAM	312000C	7982
WALLEYE	CHUCK GLOMSKI	11X112C	7778
CHAFF	DENISE NARCISSE	312000C	3632
A/E26M-2 N2 VAN	JIM CORRY	435300C	7053
LAU-138	BILL WILSON	3.1.2	3821
ADU-703/MXU-611	FIDELE LEGERE	3.2.3	4284
BR/ML/SE	RAY SKILES	4.3.5	2659
TARPS	FRANK BERTRAIN	3.1.2	7982
F-14 MAINT SHOP	GEORGE CLINE	3.2.3	7894
BMB RACK TECH PUBS	DAVE MILLER	3.2.5	4878
MSL LAUNCHER TECH PUBS	J. THOMPSON	3.2.5	4265

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.50 CAL AMMUNITION	STAN WILLIAMS	2024	5979
SIGNAL CARTRIDGES/MLM	JESSICA HARKER	4027	2911
PARACHUTE FLARES	LANNY CASE	4027	5574
DECOY FLARES	TODD DEATON	4027	2913

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TELE: COMM (906) 866-XXXX, DSN 744-XXXX

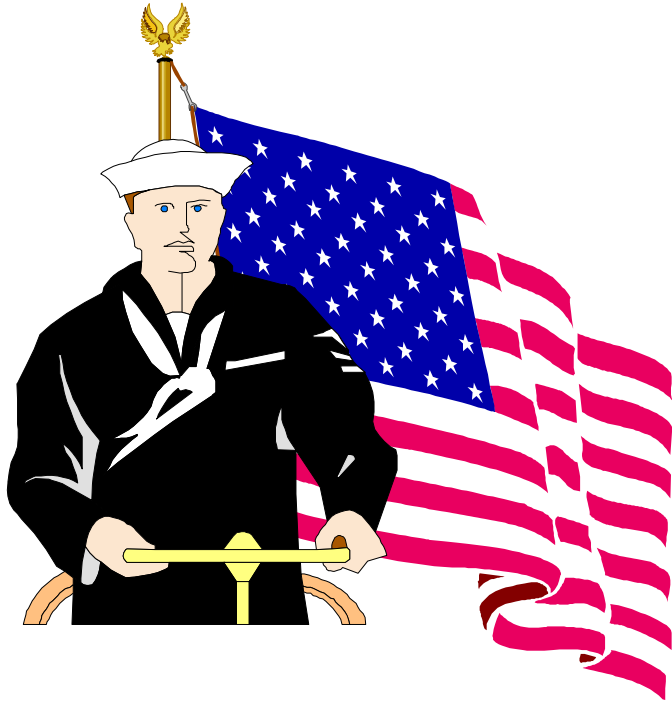
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WEAPON CONTAINERS	ROBERT FRENCH	50	2830

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